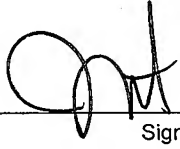


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| PRE-APPEAL BRIEF REQUEST FOR REVIEW | | Docket Number (Optional) INF 2004 SP 00138 US |
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| <p>First Named Inventor Wunnicke, <i>et al.</i></p> | | <p>Examiner Brittany L. Raymond</p> |
| <p>Art Unit 1795</p> | | <p>Examiner Brittany L. Raymond</p> |
| <p>Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.</p> <p>This request is being filed with a notice of appeal.</p> <p>The review is requested for the reason(s) stated on the attached sheet(s). Note: No more than five (5) pages may be provided.</p> <div style="display: flex; justify-content: space-between; align-items: flex-start; margin-top: 20px;"><div style="width: 45%;"><p>I am the</p><p><input type="checkbox"/> applicant/inventor.</p><p><input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)</p><p><input checked="" type="checkbox"/> attorney or agent of record. Registration number <u>35,272</u></p><p><input type="checkbox"/> attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34. _____</p><p>NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.</p></div><div style="width: 50%; text-align: center;"> _____ Signature Ira S. Matsil _____ Typed or printed name 972-732-1001 _____ Telephone number 6/5/08 _____ Date</div></div> | | |
| <p><input checked="" type="checkbox"/> *Total of <u>1</u> form is submitted.</p> | | |

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|-------------|--|-------------|----------------------|
| Applicant: | Wunnicke, <i>et al.</i> | Docket No.: | INF 2004 SP 00138 US |
| Serial No.: | 10/781,920 | Art Unit: | 1795 |
| Filed: | February 20, 2004 | Examiner: | Brittany L. Raymond |
| For: | Method for Fabricating a Resist Mask for Patterning Semiconductor Substrates | | |

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Claims 1-5, 9-11, 13, 14 and 16-20 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Singh, *et al.* (U.S. Patent No. 6,479,820, hereinafter "Singh") in view of Hyon (U.S. Patent Application Publication No. 2004/0072108, hereinafter "Hyon") and Chao, *et al.* (U.S. Patent No. 5,696,174, hereinafter "Chao"). Applicant respectfully traverses this rejection.

1. Facts

- Claim 1 requires applying tetradecyltrimethylammonium bromide (TTAB) to the patterned resist film thereby forming a salt with negatively charged groups on a sidewall of the patterned resist film.
- Chao teaches a stable and water-resistant aqueous foam composition containing (1) a long chain cationic organic compound and (2) a long-chain anionic organic compound.

- Singh teaches neutralization of negatively charged resist using a cationic surfactant.
- Hyon teaches reducing the surface tension of a rinse liquid using a fluorocarbon surfactant with deionized water to reduce resist pattern collapse.

None of the prior art references alone teaches applying tetradecyltrimethylammonium bromide (TTAB) to a patterned resist film to form a salt with negatively charged groups on the sidewall of the patterned resist film.

2. Issues

1. Does Chao teach tetradecyltrimethylammonium bromide as being a surfactant for an interface with a resist?
2. Would it have been obvious to one skilled in the art at the time of the invention to use tetradecyltrimethylammonium bromide to prevent collapse of a patterned resist line, when tetradecyltrimethylammonium bromide is known to stabilize air bubbles?

3. Discussion

In the final rejection, Examiner states that “it would have been obvious to one of ordinary skill in the art to have used tetradecyltrimethylammonium bromide as the cationic surfactant in the process of Singh, as suggested by Chao, because Chao teaches that this salt increases the stability of compositions so that they do not collapse.” Final Office Action dated January 2, 2008, p. 5. Applicant respectfully disagrees with the conclusion.

Claim 1 specifically requires “applying a cationic surfactant to the patterned resist film thereby forming a salt with negatively charged groups on a sidewall of the patterned resist film, wherein the cationic surfactant is tetradecyltrimethylammonium bromide (TTAB).”

1. Chao does not teach that TTAB is a “surfactant” for a resist.

Chao does not teach tetradecyltrimethylammonium bromide (TTAB) as being a surfactant for an interface with a resist because a surfactant is *specific* to an interface. Surfactants or “surface acting agents” are materials that reduce surface tension between two phases. The interface of Chao is between water and air (aqueous foam). Even if Chao teaches tetradecyltrimethylammonium bromide as being a surfactant *between water and air*, it does not teach or suggest using tetradecyltrimethylammonium bromide as a surfactant for a different interface: *between resist* and a rinse solution. The present disclosure involves a triple phase boundary (triple point) with three different material interfaces (patterned photo resist/rinse, patterned photo resist/gas, gas/rinse). Extrapolating the use of tetradecyltrimethylammonium bromide as a surfactant for an interface between resist and a rinse solution is arbitrary.

That being said, Chao does not *even* teach tetradecyltrimethylammonium bromide as being a surfactant even between *water and air*. Chao only teaches TTAB as being a cationic organic compound. See, in Chao, col. 3, lines 50 and 51. In other words, Chao does not teach tetradecyltrimethylammonium bromide as a surfactant at all, much less between resist and a rinse solution.

Examiner also incorrectly applies Hyon by reciting, “It also would have been obvious to one of ordinary skill in the art, to have used the surfactant solution to form a

contact angle of 90 degrees within the resist patterns, as suggested by Hyon.” Final Office Action dated January 2, 2008, p. 5. Similar to surfactants, surface tension is defined between specific interfaces. In particular, Hyon teaches reducing the surface tension between rinse liquid *and* gas. Hyon leverages this reduction in surface tension of the liquid/gas interface to stabilize resist patterns.

However, the surface tension of the liquid/gas interface is different from the surface tension of the resist/liquid interface. Mixing different surface tensions is unphysical. In other words, Hyon teaches using a surfactant for the liquid/gas interface, whereas the present disclosure teaches using a surfactant with the resist interface. Hence, it would not be obvious to switch the fluorocarbon surfactant designed to reduce the surface tension of the liquid/gas interface with a TTAB designed to reduce the surface tension of the resist/liquid interface.

2. The prior art does not teach that TTAB will prevent a patterned resist line from collapsing.

Collapse of a resist line is fundamentally different from stability of an aqueous foam because unlike water bubbles with a single type of interface, stability against resist collapse arises from an advantageous combination of surface tensions of the three material interfaces. The nature of forces (surface tension) acting in Chao, a single interface (water/air) system, is fundamentally different from the present case with three interfaces. Consequently, unlike the simple system of Chao, the surface tension of each interface impacts the stability of the resist lines.

Examiner inappropriately combines Chao with Singh and Hyon as they relate to different fields of invention. Chao does not relate to the field of the present endeavor:

forming resist lines without collapse. Rather, Chao relates to stabilization of aqueous foam (air bubbles) — compositions of air and water.

By selectively combining the above applications, Examiner has invented physical properties for the present material system (resist/TTAB) which was not foreseeable by any of these disclosures at the time of the invention.

4. Conclusion

In view of the above, Applicant respectfully requests that the final rejection be withdrawn and the application be passed to issuance.

Respectfully submitted,

6/5/08

Date



Ira S. Matsil
Attorney for Applicant
Reg. No. 35,272

SLATER & MATSIL, L.L.P.
17950 Preston Rd., Suite 1000
Dallas, Texas 75252
Tel.: 972-732-1001
Fax: 972-732-9218